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AUTHOR Wertsch, James V.
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ABSTRACT

The concept of metacognition (as outlined by investigators such as Flavell and Brown) is explicated and extended by drawing on the theoretical ideas developed in Soviet psychology. In this paper 'metacognition' refers to the subject's ability to monitor, integrate and coordinate various aspects of a task. It is proposed that the notion of goal-directedness must be included in the analysis of metacognition, and it is argued that an account of the regulation of human cognition must address the issue of how this regulation is carried out in social ("interpsychological") as well as individual ("Intrapsychological") functioning. Social interaction is then analyzed in terms of a hierarchy of types of communicative moves, and adult-child interaction is analyzed in terms of this hierarchy. Levels of the hierarchy of communicative moves are: intended effect acts, mutual belief acts, conventional acts, linguistic acts. Special attention is devoted to adult-child interaction found in situations where an adult is attempting to provide metacognitive assistance to a child. (Author/RH)

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METACOGNITION AND ADULT-CHILD INTERACTION

James V. Wertsch
Department of Linguistics
Northwestern University
Evanston, Illinois 60201

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Paper presented at Northwestern University Annual Conference on Learning Disabilities, May 20,1977.

Abstract for: Metacognition and Adult-Child Interaction
(paper by James V. Wertsch, Department of Linguistics, Northwestern University)

The concept of metacognition (as outlined by investigators such as Flavell and Brown) is explicated and extended by drawing on the theoretical ideas developed in Soviet psychology. It is proposed that the notion of goal-directedness must be included in the analysis of metacognition, and it is argued that an account of the regulation of human cognition must address the issue of how this regulation is carried out in social ("interpsychological") as well as individual ("intrapsychological") funcitoning. Social interaction is then analyzed in terms of a hierarchy of types of communicative moves, and adult-child interaction is analyzed in terms of this hierarchy. Special attention is devoted to adult-child interaction found in situatons where an adult is attempting to provide metacognitive assistantce to a child.

I. Current Problems in Metacognition

Recently, there has been a great deal of interest in human cognitive processes that control other cognitive processes. One of the reasons for this interest in the U.S. is that research in the field of artificial intelligence has raised similar issues. In that field, it became apparent that we would have to include various "control procedures" and "executive routines" in any useful account. In a few instances these ideas and terms then began to find their way into psychology. For example, near the end of Cognitive Psychology, Neisser (1967) briefly covers the problems and promises of executive routines. For the most part, however, American developmental and cognitive psychologists have continued to focus their attention on the acquisition and functioning of certain cognitive skills with little concern for how a knowing agent could control and utilize them.

An exception to this trend may be found in the work of Flavell. For over a decade, Flavell (e.g., Flavell, Beach & Chinsky 1966, Flavell 1976, Flavell and Wellman 1977) has been concerned with the problems of how children gradually gain control over certain cognitive abilities and develop the capacity to apply them properly to a particular problem situation. Not surprisingly, this cognition about cognition has been labeled "metacognition." Flavell has recently described it as follows:

> Metacognition refers to one's knowledge concerning one's own cognitive processes and products or anything related to them, e.g., the learning-relevant properties of information or data. For example, I am engaging in metacognition (metamemory, metalearning, metaattention, metalanguage, or whatever) if I notice that I am having more trouble learning A than B; if it strikes me that I should double-check C before accepting it as a fact; if it occurs to me that I had better scrutinize each and every alternative in any multiple-choice type task situation before deciding which is the best one; if I sense that I had better make a note of D because I may forget it;

> ... Metacognition refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective. (1976, p.232)

A few other investigators such as Brown (1974) and Paris (in press) have also provided several interesting theoretical and empirical contributions to the study of metacognition.

To date, several different types of phenomena have all been grouped together under the heading of metacognition. For example, sometimes investigators are concerned with a subject's conscious reports of what he did or predictions about what his performance would be on a certain task. In other instances, investigators speak of the subjects' ability to monitor his activity only at the level necessary to coordinate and control the various abilities involved in carrying out the task. In the latter case there is no mention of subjects' abilities to produce verbal judgments, predictions or reports about their performance. The level of consciousness required to carry out a task is much different from that which may be required to make reports or predictions about it. This fact would seem to make these two aspects of metacognition different and require further theoretical distinctions in this area. The present paper will be concerned with the subject's ability to monitor, integrate and coordinate various aspects of a task without regard for his ability to make verbal assessments on predictions about his performance.

A further point to be made in connection with the various phenomena that have been grouped under the heading of metacognition is that as we pursue problems in this area further and further, the distinction between cognitive and metacognitive abilities will become less and less clear. It quickly

becomes obvious that there is not a single well-defined set of abilities we can call metacognitive abilities and that we can make a neat distinction between them and "mere cognitive" abilities. The only framework in which such a conceptualization could work would be one in which the cognitive abilities are completely well-formed, deterministic "routines" which always operate in the same way and never need further metacognitive guidance. In such a system, once such routines were selected and activated by metacognitive procedures, they would carry out their portion of the task with no need for further metacognitive control. It turns out, however, that self-monitoring and control procedures seem to operate at almost every level of cognitive functioning. This fact makes it much more difficult for us to make neat analytic distinctions between cognitive and metacognitive abilities. The approach used in this paper should not be viewed as making any claims in this area. Rather, it will be concerned with certain aspects of human functioning where there is no question that metacognitive abilities are involved and will not try to define the dividing line or determine the "mix" of cognitive and metacognitive abilities in any task.

At this point, let us pause to look at an example of how metacognition plays a role in human problem solving. This example will contrast two hypothetical human problem solvers who are told to build a small brick tower in accordance with a model. The subjects can select bricks from a pile that includes bricks needed to build the tower as well as a large number of extras. In the spirit of Bransford, Nitsch & Franks (1976), we shall label one of our hypothetical subjects the "metacognition expert" and the other the "metacognition infant." The metacognition expert would want

to be certain that he has understood all the directions and requirements of the task before beginning. He would want to know what we have in mind when we say make a tower in accordance with the model. Does this mean that he must use bricks of the same shape and color throughout his tower as are in the model? Furthermore, he would want to know whether or not there are time limitations etc. That is, he will generally be concerned with establishing the goals and allowable means for this task. In contrast, the metacognition infant will often impulsively begin the task without being certain of these factors. He may begin listening to the instructions, but before hearing them in their entirety, he may begin the task and execute it incorrectly or incompletely because he failed to understand the goal and acceptable means. On his bad days, the metacognition infant may not only misunderstand the nature of the goal; he may not even realize that goal is involved. On these days the metacognition infant may play aimlessly with the bricks and never even begin to carry out the required task.

Once these two subjects begin the task, we will see further differences which are very interesting. After understanding what the goal(s) and acceptable means are, the metacognition expert will make a number of decisions about how to proceed. He will decide whether he will begin his construction from the top, the bottom, or some other point in the model. He will decide which sorts of bricks will be needed and may select them before beginning or may select each one as he is carrying out the task. That is, he will coordinate the selection of bricks with the building task. He will carry out complex self-monitoring throughout the task. For example, after completing each substage of the task, he will check back with the "master plan" to see what the next

step will be. This means that monitoring will not only involve selecting and beginning each subtask; it will also involve knowing when a subtask is completed and how to regain access to the master plan at a particular point in order to go on to the next subtask. Another way of describing the procedures used by the metacognition expert is to say that he will not be distracted away from his task. He will not allow free associations to interfere with his decision-making processes, and he will be able to ignore irrelevant environmental stimuli. Furthermore, while engaged in carrying out a particular subtask, he will not become so engrossed in it that he will forget that it is only part of a more global task. He will return to the overall plan or model in order to go on to the next step. Also, he will return to the master plan properly in the sense that he will remember where he was. This will allow him to go on to the next step rather than mistakenly returning to an earlier point and redoing a subtask he just executed or skipping several steps.

The metacognition infant can be expected to have difficulties in some or all of these areas. He may begin the problem with the apparent strategy of building the brick tower from the top but then seem to shift to building it from the bottom. He may be easily distracted by all sorts of irrelevant environmental stimuli to the extent that he never will get back to the main task. He may lose track of where he is in the master plan and repeat or skip over steps. In general, we would be tempted to say of the metacognition infant that he cannor pay attention, he cannot concentrate on one task and he cannot complete a task by himself. He has trouble deciding which steps he should take in solving a task, and even if he figures this out, he never follows them through to completion.

It is no accident that this description of the metacognition infant sounds similar to accounts that teachers sometimes give of young children or accounts clinicians give of patients with certain types of brain damage. My interest in metocognitive processes has arisen largely as a result of examining the accounts of teachers and clinicians. It turns out that the study of metacognition can have important practical implications in these areas, but to go into these would be to get ahead of the story at this point.

I.A. The Notion of Goal in Theories of Metacognition

Central to any account of metacognition will be the notion of goal-directedness or purposefulness. Without the notion of a goal it makes no sense to talk about monitoring one's activity in such a way that appropriate cognitive skills will be selected and applied to a task. Furthermore, without the notion of a goal it makes no sense to speak of irrelevant environmental stimuli. In order for these notions to be interpretable, we have to aks whether something is appropriate or relevant for some goal.

By considering the following example, we can see how this is so. Suppose we ask someone to read a passage strictly for the purpose or goal of comprehending its content. Given this goal, it makes no difference whether some of the text is written in red ink and some in black ink. In this case, distraction by irrelevant environmental stimuli could consist of the reader's becoming so concerned with the color of the ink in which a word was written that he failed to comprehend the text properly. On the other hand, if the goal was to count the number of words written in red ink and the number of words written in black ink, the situation is just the opposite. In this case, distraction by irrelevant

environmental stimuli would consist of the subject's becoming overly concerned with comprehending the material in the text and not concentrating on the color of the ink in which the words were written. In this simple example it is easy to see how one's definition of the goal can change the determination of what is appropirate and relevant in a task situation. The point is that the identification of a goal is a determining factor in any task and becomes especially important when we wish to consider problems in the realm of meta-cognition. In general, one can only speak of monitoring cognitive processes if there is a goal involved. Otherwise there would be no criteria available to make judgments about the relevance of stimuli and judgments as to whether correction or redirection is required.

The notion of a goal has played a relatively minor role in theoretical frameworks employed by American psychology. With the exception of work by figures such as Tolman (1932) and Miller, Gallanter & Pribram (1960), it is difficult to find references to notions like goals, purposefulness, and means-ends relationships.

I.B. Soviet Approaches to the Study of Goal-Directed Activity and Its Origins

Unlike its American counterpart, Soviet psychology has not been hesitant to study problems of goal-directed activity and its regulation and self-regulation. A.N. Leont'ev (1959,1975), the major theoretical figure in this area, has developed a conceptual framework based on the ideas of S.L. Rubinshtein and L.S. Vygotsky which is known as the theory of activity (deyatel'nost'). There are three different levels of abstraction in Leont'ev's account. The first level is concerned with activity. The second level is

concerned with the notion of an action (deistvie) and its corresponding goal (tsel'). These constructs have been at the root of a great deal of theoretical and empirical research in Soviet psychology. For example, Luria uses them in an implicit way in neurolinguistics (see Wertsch 1976 for an analysis), P.I. Zinchenko (in progress) used them in the study of memory, and A.A. Leont'ev (in progress) has used them in the analysis of social interaction. The notion of a goal has had such a heavy influence on the type of research done in the U.S.S.R. that in many instances the American investigator will have more questions about why his Soviet colleague chose a particular research problem than about the methodology or outcome of the study. American psychologists will usually find it more profitable to try to understand the theoretical assumptions and claims that underlie Soviet research than to attempt to assimilate Soviet experimental results to the theoretical framework they are accustomed to using. This is especially true in cases where the American investigator is interested in studying goal-directedness in human cognition. It is no accident that researchers in metacognitive processes such as Brown (in progress), Flavell (1977) and Paris (in press) have begun to examine the literature in Soviet psychology more closely while developing the theoretical foundations for their own research.

While it is true that some American psychologists are beginning to use ideas from Soviet psychology in their study of metacognition, we have not yet taken one of the assumptions into account that would guide the Soviet investigator. This assumption has to do with Vygotsky's notion of the developmental mode of explanation in psychology. American research has been concerned with developmental problems, but only up to (down to?) a point. It has examined the development of metacognitive abilities in children who are confronted with

solving various tasks by themselves - that is, without the aid of adults. Based on the theoretical foundations established by Vygotsky, Soviet psychologists have pushed the developmental explanation further and have viewed self-regulation as an ability that emerges out of much earlier ontogenetic roots - namely, early social interaction between the child and an adult. In pursuing this form of genetic explanation of self-regulation, Soviet psychologists such as Luria (1961), Leont'ev (1959) and Vygotsky (1956,1960) have stressed several points which are of interest for American developmental psychologists interested in problems of metacognition.

Perhaps the most important point is that Soviet psychologists have emphasized that the developmental framework is the highest form of explanation (Vygotsky, in progress) in social science. This emphasis on developmental explanation is based on Marx's ideas of historical materialism and views ontogenesis as only one of several forms of development that can be used as a basis of explanation in accounts of human mental processes. Vygotsky emphasized the historical, phylogenetic and ontogenetic aspects of development to such a degree that his theory is now referred to as the "cultural-historical" approach to the study of human thought. For the study of metacognition, this heavy emphasis on developmental factors means that the Soviet psychologist would insist that we can only understand this (or any other) aspect of human cognition by tracing it back to its earliest developmental roots. Therefore, while Vygotskians would agree that the developmental perspective presently being used to study metacognition is a proper approach, they would assert that it is not being pursued far enough. They have argued that we shall never have a complete account of self-regulatory (or in our terms,

metacognitive) abilities until we push this account back to its developmental origins.

The idea of tracing metacognitive function all the way back to its earliest ontogenetic roots is not just of interest to the Vygotskian who would argue that such a developmental approach is important for reasons having to do with the philosophy of science. It is an important area of study for anyone who is interested in examining the nature of metacognitive abilities at various stages of development. Whether or not Vygotsky's arguments motivate one's desire to examine metacognition and its manifestations in young children, the major claim to be made here is that adults (usually mothers) carry much of the "metacognitive load" for children during their preschool years. The claim is that children are capable of carrying out many small tasks but have major problems in organizing and monitoring their goal-directed action. Adults interact with children in such a way that they provide these metacognitive abilities for them. Whereas mature metacognition may be viewed as <u>self</u> monitoring and <u>self</u> regulation, adults help children solve tasks in such a way that we need to speak of <u>other</u> monitoring and <u>other</u> regulation. Before going into the claims we wish to make with regard to this interaction, we need to note another major point that Soviet psychologists would bring up in an account of metacognition. Actually, we have already touched on this area in examining the Soviet emphasis on tracing a psychological ability back to its earliest ontogenetic roots.

This claim is that the traits and cognitive capacities of the individual emerge out of social interaction. Vygotsky emphasized in several places that any account of the individual personality must not only be developmental. In

addition, it must also ultimately be based on social interaction. Here again, one can see the heavy influence that Marx had on Vygotsky's psychological theory. Basically, Vygotsky applied to ontogenesis some of the ideas Marx developed in his historical account of consciousness and human economic systems.

The point here is that the investigator should not be surprised if it turns out that an account of an area like metacognition is ultimately based on an analysis of social interaction. Vygotsky (in progress) stresses that this is a natural consequence of pursuing a developmental account of human cognitive processes since, as he puts it, all human abilities first arise on the "interpsychological" plane of functioning and only later on the "intrapsychological" plane of functioning. While the present paper is not concerned with defending all aspects of the socio-developmental account that Vygotsky proposed, it is theoretically motivated by that account and consequently seeks to provide a framework within which we can begin to look at how the metacognitive guidance in task-oriented adult-child interaction is an important factor in the development of children's metacognitive abilities. Like Wood, Bruner, and Ross, we assume that this type of interaction "... can potentially achieve much more for the learner than an assisted completion of the task. It may result, eventually, in development of task competence by the learner at a pace that would far outstrip his unassisted efforts." (1976, p.90)

It should be pointed out that we do not think that adults provide the metacognitive overlay for young children for the first year or two of the child's life and then stop to let the child take over full responsibility in

this area. Rather, in certain situations we continue to see the adult providing some form of metacognitive guidance for the child over a much longer period. For example, in elementary school classrooms, teachers help children solve problems by pointing out which step comes next, by asking questions that help the child identify the goal and means involved in a problem, etc. For some reason, we seem to believe that in the paradigm situation, teachers are solely concerned with providing facts about various topics and the students assimilate these facts. By watching interaction between teachers and students, however, it quickly becomes apparent that teachers are spending most of their time doing something else. They are constantly giving directions and asking questions having to do with problems (either real life or academic) that the child is attempting to solve. In such cases it turns out that they help the child solve these problems by directing him to the next step ("What do you need to do now? Why?"), keeping the goal before him ("Why do we have to do this?" "Where do we want to end up?") and providing the planning function about the various means to be used to reach the goal ("How else could you do that?").

It is interesting to note that teachers tend to use questions rather than commands or statements in order to provide the metacognitive guidance for the task. By doing this they focus the chils's attention on specific aspects of the task which will be relevant for the next step to be taken toward the goal. It also allows them to elicit the student's participation to the highest level possible. Rather than taking over full responsibility for metacognitive processing, whenever possible, teachers tend to point to the relevant factors in the task situation by asking the child to answer question about it and

letting the child take over from there.

These observations indicate that we should not assume that it is only the preschool child who participates in interaction where one person contributes most of the metacognitive regulation to the goal-oriented task. However, in this paper we shall be primarily concerned with interaction between adults and young children (preschoolers). The rest of the paper will be concerned with analyzing some of the properties that characterize this interaction.

The type of communicative setting in which are primarily interested is one in which a child is trying to execute some goal-directed task and the child's mother provides assistance. The first thing to note about this situation is that one can view it as a single goal-directed system. The only difference between it and a situation in which a single individual is capable of carrying out the task is that the abilities needed to solve the problem are supplied by two individuals instead of one. Furthermore, as we have been claiming, these abilities are not randomly divided between the two participants. Rather, the mother is primarily responsible for providing certain information about the metacognitive regulation of the two-person system, the the child carries out various steps in the procedure once they have been identified and perhaps initiated with the help of the mother.

With this type of system, it is possible for the child to carry out a series of steps in the task without ever realizing how they are related to the goal. In fact, in some situations, the child may not recognize that a goal is involved at all or not recognize that it has been reached. According to Vygotsky, interaction in which the child executes certain tasks

(perhaps with help of an adult) many times before becoming consciously aware of what it is that he is doing is a necessary link in the developmental chain of many cognitive abilities. Only by carrying out these tasks in this way will he ever be able to become consciously aware of them and be in a position to gain control over them.

What kinds of things can we expect a mother to do in order to provide the metacognitive regulation we are describing? If we go back to our example of the metacognition infant, we can see a few things that the adult might be expected to contribute to a goal-directed task situation involving a child. First the adult participant will presumably understand the goal of the task and may or may not inform the child as to its nature. We are not making any specific claims here about whether the adult will inform the child of the goal or not. It will depend on the task and the participants. However, we are claiming that it is a factor that the adult must take into account in some way in order to carry out the interaction. Second, the adult will often be responsible for making certain that the child is aware of the perceptual or conceptual facts which are relevant to the task. At this point, one should again note that the goal of the task will determine what is relevant. In most cases the adult seems to assume that the child can perceive and identify certain aspects of the stimuli wuch as color and shape, so there is little interaction concerned with the fact that there are such facts. Rather, whenever the mother either points out or asks a question about, say, a color or shape, we can see that what she is doing is helping the child single out the relevant perceptual attributes, given the goal. If the mother and child are working together on a goal-directed task and the mother tries to bring

some perceptual dimenstion to the child's attention, we can assume that she is doing this because it has something to do with reaching the goal. Third, the mother will often arrange the environment in such a way that the child will be able to deal with each step of the task separately. For example, in our brick tower example with the metacognition expert and the metacognition infant, the mother might help the child identify and separate all the bricks needed to build the tower before the child ever begins to put the bricks together.

Fourth, mothers often spend a great deal of their time in such situations reminding the child where he is in the task. That is, she helps him keep his place so that he will not repeat steps without returning to the master plan and he will not skip over steps. Of course this list of four ways that mothers provide metacognitive assistance to a child is not intended to be exhaustive. However, it does begin to give us some idea of the many ways in which the mother's participation will guide the child's goal-directed activity.

II. Types of Communicative Moves: A Hierarchy

Now that we have identified one of the functions of mother-child interaction as the mother's providing metacognitive assistance to the child, we need to explore the various types of interaction that the mother may use in order to accomplish this task. Recently, there has been a proliferation of studies of mother-child interaction, but most of them have dealt primarily with the use and acquisition of the linguistic code. As I hope to demonstrate here, this is not the best way to approach mother-child interaction

if we are to understand how it functions in cases where the mother is providing metacognitive assistance. As was the case in previous sections of this paper, much of what I have to say here will be theoretically motivated by Vygotsky's writings. In addition, I shall rely heavily on recent work in language philosophy as it has been developed in the West (e.g., Grice 1957,1968, to be Lewis 1969, Schiffer 1972). Although the theoretical framework proposed here will be developed for the purpose of examining mother-child interaction, it will not be applied to mother-child interaction until we have provided a complete general outline of the approach. In developing this outline, we shall first employ examples which are useful in explicating it but are not concerned with mother-child interaction. Then we shall see how it applies to problems in this area.

The first major step necessary for the argument to be developed here is that we must begin to look at human communication in terms of the goal-directed moves it involves rather than in terms of the linguistic code it may utilize. One might object to the opposition we are establishing between these two perspectives on the basis that they are not incompatible. For purposes of the present paper, we are not so concerned with settling these issues as we are with identifying and avoiding a weakness that plagues many arguments found in contemporary psycholinguistics. This weakness emerges as a result of assumptions which are not made explicit or clear. It arises because a set of implicit assumptions finds its way into analyses in such a way that that the linguistic code tends to become reified, and we forget that it has a function as well as a form. One does not have to look very far in recent work in linguistics to discover that researchers are aware of the problem. Furthermore,

some linguists (e.g., Green 1974) argue that by becoming overly concerned with properties of the linguistic code and ignoring how it is used we are missing some of the fundamental points we must eventually face in order to arrive at a sound theoretical perspective.

The problem of ignoring human interaction as a result of becoming overly concerned with the linguistic code deserves attention in linguistics, but it is a much more important problem for behavioral scientists interested in language. This is so because investigators in the latter area are concerned from the very beginning with how utterances are processed and used. As a few investigators such as Rommetveit (1974) have pointed out, the eventual goals of psycholinguistics and other behavioral sciences interested in language cannot stop at analyzing the linguistic code. However, if anything, linguistics has recently led the way in demonstrating how we must address issues beyond the confines of the linguistic code itself. It has often been the case that in language-related disciplines in the behavioral sciences, so much effort has been put into examining how the linguistic code influences processing that the analysis of the interactional framework into which the linguistic code fits is ignored. We are truly in a position of not being able to see the forest for the trees.

Before proceeding to the analysis of what it means to say we are analyzing goal-directed communicative moves, it is necessary to make one additional point clear about our claims concerning the relationship between those moves and the linguistic code. We shall not be concerned with developing an argument either for or against the notion that it is possible to derive an analysis of linguistic meaning on the basis of the nonlinguistic intentions,

uses, purposes, functions etc. involved in communicative moves. This issue is at the center of a continuing debate in language philosophy (e.g., Davidson 1974, Strawson 1971). Rather, we are interested in the psycholinguistic problems of how humans process the meaning of a particular communicative move and in the problem of how a linguistic code can fit into this framework. The notion of a goal-directed communicative move is more fundamental in this approach in the sense that the meaning of a segment of the linguistic code only is interpretable given this foundation. However, this does not necessarily imply that an analysis of the linguistic code in general must be derived from an analytically prior level of social interaction.

In the arguments presented here we shall focus on the goal-directed nature of action and interaction. Such an approach is not particularly familiar in western psychology, but as mentioned earlier it has played an important role in the philosophical foundations for psychological theory developed in the Soviet Union. Much of the argument to be presented in the present paper has been theoretically motivated by this approach in Soviet psychology, but I shall rely even more heavily on recent work in American philosophy of action (especially the work of Davidson) for specific points since it is more compatible with other theoretical perspectives that will be built into the argument. We shall be interested in what Davidson (1963) has called the "primary reason" for an action since it provides the analytic device that will eventually be needed in our analysis of the human interaction involved in adult-child interaction.

In Davidson's analysis, a belief and a desire combine to form the primary reason for an action. He has outlined the belief and desire aspects

involved in the analysis of an action in the following manner:

> Whenever someone does something for a reason, therefore, he can be characterized as (a) having some sort of pro attitude toward actions of a certain kind, and (b) believing (or knowing, perceiving, noticing, remembering) that his action is of that kind. Under (a) are to be included desires, wantings, urges, promptings, and a great variety of moral views, aesthetic principles, economic prejudices, social conventions, and public and private goals and values in so far as these can be interpreted as attitudes of an agent directed toward action of a certain kind. (1968)

Although we often mention either the belief or the desire in everyday descriptions of an action, Davidson has pointed out that both are readily recognized as being necessary in any complete account of it. For example, we might explain John's going to the store to buy some bread either by saying, "He went to the store (because) he thinks, believes) they sell bread there." which involves an assertion about John's beliefs and an assumption about his desires, or we might say,"John went to the store because he wanted bread." which involves an assertion about John's desire and an assumption about his beliefs. While either one of these two accounts of John's going to the store are readily accepted in everyday conversation, no one would claim that the assumed portion of the primary reason could be false (rather than left out) and that a rational explanation of the action would remain. Therefore, both parts of the primary reason are necessary in any complete explanation.

Another important point to keep in mind is that in Davidson's analysis of action, it is not necessary that the agent be consciously aware of his beliefs and desires. As he puts it:

> We cannot suppose that whenever an agent acts intentionally he goes through a process of deliberation or reasoning, marshalls evidence and principles, and draws conclusions. Nevertheless, if someone acts with an intention, he must have attitudes and beliefs from which, had he been aware of them at the time, he could have reasoned that his action

> was desirable (or had some other positive attribute). If we can characterize the reasoning that would serve, we will in effect have described the logical relations between descriptions of beliefs and desires, and descriptions of action when the former give the reasons with which the latter was performed. (1975)

It is important to keep this disclaimer about conscious processes in mind. As a philosopher, Davidson is not interested in whether or not the beliefs and desires for an action involve conscious psychological processes. Rather, he is interested in developing an analytic system that will allow the philosopher to explain human action on the basis of such theoretical constructs For psychologists, this means that one must not try to translate these philosophical categories into psychological ones and assume that beliefs, desires and the like are conscious psychological processes or states. While there undoubtedly are psychological processes of some sort that are going on when we are carrying out acts and the reasoning that is behind them, their relationship to the analytic categories outlined by Davidson remains an open question. Although Davidson's approach does not give us any direct insight into the psychological processes involved in human action, it turns out to be very useful for our purposes since it provides the foundations for a theory of interaction that will allow us to identify and classify certain types of communicative moves. This classification scheme will, in turn, be the basis for our analysis of mother-child interaction.

For the reader interested in the relationship between Leont'ev's theory of activity and Davidson's theory of action, we can point out that Davidson's account covers both what Leont'ev calls an action (deistvie) and what he calls an operation (operatsiya). Since his theory is concerned with psychological processes (as opposed to logical analysis) Leont'ev is interested in whether or

not an agent is consciously aware of a goal. The main criterion that separates an action from an action is the level of conscious awareness at which the agent is functioning. In the case of an action the agent is consciously aware of the goal involved, whereas in the case of an operation he is not.

The main purpose of this section of the paper is to outline a hierarchy of various types of human interaction. This hierarchy ranges from a point where one agent can influence another without the second agent's being aware that another agent is involved to a point where two agents are locked into interaction and both are aware of this fact. The four levels of the hierarchy are separated on the basis of several criteria. These levels are not the only ones that could be identified. No attempt at building an exhaustive classification will be made here. Rather, the levels have been identified and developed on the basis of how they will be useful in our argument about adult-child interaction. The framework to be proposed in this specific hierarchical analysis is based on the one developed by Bickhard (in progress).

Before beginning our analysis of the hierarchy, several comments are in order about the terms we shall be using. We shall use the term "speaker" (S) to refer to the agent that initiates the goal-directed interaction. It is convenient to refer to this agent as speaker even though the actions carried out may not involve speech. The action may be in the form of changing certain aspects of the environment in such a way that the "audience" (A) will somehow be influenced. We shall also be using the notion of the "response" (r) produced in A. For our purposes, r may consist of nothing more than A's understanding what it is that S intends. We do not want to go any further in our analysis of a response produced by A since S's "responsibility" usually

stops with A's understanding of S's "utterance" (x). (Again, x need not be in the form of a verbalized utterance.) For example, let us imagince a case where S utters x in order to get A to open a window. There are several utterance types S could use. but in most cases something like "Could you open the window please?" will suffice. Now it might be the case that A understood x in this case (that is, A made the response (r) of understanding x), but A did not open the window for any one of a variety of reasons (the window was sealed shut, A dropped dead before getting a chance to carry out the command, A refused). In such cases, we want to be able to deal with the fact that A understood x but did nothing as a result of understanding it.

The first level of the hierarchy which we shall outline is concerned with what we shall call intended effect acts. We can define them in the following way:

In an intended effect act, S utters x in order to produce r in A.

In our analysis, we shall be working down a hierarchy. As we do so, we shall go from levels which cover larger sets of acts to levels which include smaller and smaller subsets of acts. It will be useful in this analysis to outline the properties of acts which represent "pure" cases at each level. The entire system of acts is structured in such a way that acts which represent pure case at any level satisfy the defining criteria at that level and the criteria of all higher levels but do not satisfy those of any lower levels. In the case of a pure intended effect act we are already at the highest level, so it satisfies the criteria of that level only. We can define a pure intended effect by modifying the definition of an intended effect act in the following way:

A pure intended effect act is an act in which S utters x in order to produce r in A, but S does not intend to produce r in A by virtue of A's recognition of S's intention to produce r in A.

What would be an example of a pure intended effect act? The reason for its "purity" will only become apparent after we have taken our analysis at least one level lower in the hierarchy, but we shall outline the example now and ask the reader to withhold questions until after we have moved to the next level.

In the case of a pure intended effect act, S will not rely on A's recognition of S's intentions (i.e., intentions to get A to produce r) in order to get A to produce r. Let us take the following example. S is walking through the wilderness and discovers a pool of quicksand. He knows that A will soon be coming along the same route. A does not know that S is going ahead of him. S wants A to know that quicksand is in the vicinity (i.e., the response (r) that S wants to produce in A is for A to know that a pool of quicksand is in the vicinity).

There are several ways S could produce r in A. One way he could do so would be to break off a branch from an overhanging tree and drop it into the quicksand where it will sink up to some point. In the imaginary example we are creating here, it is important that it looks to A as if the branch could have fallen into the quicksand without anyone's help. That is why we chose a branch from an overhanging tree for our example. Let us assume that A arrives on the scene, sees the branch in the quicksand, and thereby comes to believe that there is quicksand in the area. In this case, S has produced r in A by uttering x (x is his act of placing the branch in the quicksand). Note that A did not have to recognize any intention on the part of S in order to

produce r. In fact, A did not even recognize that S was involved at all. The only thing A recognized was that there is a pool of quicksand in the vicinity. He came to believe this (i.e., produced this r) by seeing the stick and not by virtue of recognizing that S intended to get A to believe it. This is an example of a pure intended effect act since S uttered x in order to get A to produce r, but S in no way depended on A to recognize S's intention to produce r in A.

In other cases of a pure intended effect act, it is possible for A to recognize that someone (some S) intended for him to produce r, but the reason for A's producing r would still not be that A recognized S's intention. That is, there may be situations in which A will produce r, and A will also recognize S's intention to get A to produce r, but the reason behind A's producing r will be something other than the recognition of S's intention to get A to produce r. In this case, S's intention to get A to produce r will be irrelevant in an explanation of why A produced r. S may realize that A will recognize S's intention to produce r in A, but S will intend to produce r in A by some means other than A's recognition of S's intention to produce r in A. In this case, S's intention to get A to produce r will be irrelevant in an explanation of why A produced r. That fact that it is irrelevant will make such an act a pure intended effect act.

An example of this type of a pure intended effect act would be the following. Let us assume that S wants to get A to think that a third party (C) was at a particular place. For example, let us assume that we have a mutural friend (C) who has told you that she has never been to the Grand Canyon.

Actually, I know that she lied to you and she has been there. Furthermore, assume that I want you to know that she has been there (and by implication that she has lied to you). There are a number of ways I could try to convey this message, only some of which would constitute a pure intended effect act. I could use a pure intended effect act if I were to place a photograph showing C at the Grand Canyon in some place where you would see it. Let us say that I know that you always eat breakfast at a certain table in you house and before breakfast some morning I put the photograph on that table next to where you always put your coffee cup.

In this case you might recognize that someone is trying to tell you something. After all, pictures do not just fall from the sky onto breakfast tables. However, the fact that you (A) recognize that someone (some S) is trying to get you to believe that C was at the Grand Canyon is not the reason for your believing that C was at the Grand Canyon. The belief arises because of the evidence you have in the photograph. Because I (the S) intended to produce the belief that C had been to the Grand Canyon without relying on your (the A's) recognition of S's intention to produce that belief, we still have a pure intended effect act in this case. Unlike our first example, A may recognize that there is an S and that S intends to produce r in A, but this recognition plays no role in producing r in A.

Certain aspects of pure intended effect acts will become clearer after we move on to the next level of our hierarchy. This next level is concerned with <u>mutual belief acts</u>. At this level, we still want to speak of S trying to get A to produce r, so we are still dealing with intended effect acts, but

the definition of mutual belief acts also specifies a certain type of means whereby S gets A to produce r. Therefore, we shall be dealing with a special case of intended effect acts. Remember that in our definition of intended effect acts, no mention was made of the means S would use to get A to produce r. The only thing we said about the means that S could use in order to get A to produce r was in the definition of pure intended effect acts. There we said that S could not intend for A to produce r by virtue of A's recognition of S's intention to get A to produce r. Part of the definition of pure acts at each level of our hierarchy is concerned with how they contrast with acts at other levels. Our definition of a pure intended effect act contrasts with the definition of pure mutual belief acts because in the case of the former, S cannot use the means which are utilized in mutual belief acts.

We can define a mutual belief act as follows:

> A mutual belief act is an intended effect act in which S utters x with the intention of producing r in A by virtue of A's recognition of S's intention to produce r in A.

In this definition, we have specified the means whereby S produces r in A. Crudely stated, we can say that S can take advantage of the fact that A can recognize his intentions. For the purposes of our hierarchical system, it is important to note that we have not said anything about conventional and linguistic systems. Since these systems play a role at lower levels of our hierarchy, in order to deal with mutual belief acts (especially pure mutual belief acts) we do not want to bring them into our account at this point. We want to exclude the use of conventional and linguistic systems in the case of a pure mutual belief act which we can define as follows:

A pure mutual belief act is an intended effect act in which S utters x with the intention of producing r in A by virtue of A's recognition of S's intention to produce r in A, and S does not utilize any conventional or linguistic means in order to get A to produce r.

Before going any further in our analysis, it might be useful to outline an example of a pure mutual belief act. Let us take the situation from our previous example of the two parties walking through the wilderness where the first party (S) comes across the quicksand pool and wants to warn A that it is quicksand. Remember that in the case of the pure intended effect act S wanted to get A to believe that it was quicksand in some way other than by A's recognition of S's intention. In fact, in the first example we used, S arranged the environment in such a way that A would produce r without even recognizing that any S existed. In the case of a pure mutual belief act, S wants to rely on A's recognition of S's intention (to get A to believe that there is quicksand in the vicinity) in order to get A to believe that there is quicksand in the vicinity. However, in the case of a pure mutual belief act, S does not rely on conventional or linguistic means in order to get A to recognize S's intention. What kind of act could fulfill these criteria? Let us consider a case wherei. S discovers the quicksand pool and stations himself next to it to wait for A to come along that trail. When A arrives, let us imagine that he asks S whether there are any quicksand pools in the area, and in response, S dips his hand into the pool and holds up a handful of quicksand. In this case, it would be normal for A to infer that S did this for some reason, namely, that S intended A to believe that there was quicksand present and to form this belief by virtue of recognizing S's intention to get him to form this belief. It is true that A could infer that quicksand was present anytime he saw

S go through this procedure regardless of whether S was doing it in response to A's inquiry or not. That is, if A saw S holding a handful of quicksand and S was unaware that anyone was watching him, A could still infer that quicksand was present, but he certainly would not infer this by virtue of recognizing S's intention for A to form such a belief. This second situation is neither an example of a pure mutual belief act nor an example of a pure intended effect act since it is not the case that S is carrying out that act in order to produce r in A. However, in the hypothetical situation we have outlined where S carries out the act (i.e., utters x) in response to A's inquiry, we have an instance of a pure mutual belief act.

It is important to note here that while S wants to produce r in A by virtue of A's recognition of S's intention to produce r in A, S does not rely on any conventional or linguistic means to do so. No linguistic system was involved in S's reply, and there is nothing about the "content" of S's utterance that could be called conventional. It is certainly not a convention for S to answer A's question by holding up a handful of quicksand (although the two parties could create such a convention either through precedent or through explicit agreement).

Two more observations should be made about the general nature of pure mutual belief acts. First, in general, it seems that such acts allow S to get A to recognize that S is attempting to tell him something and allow S to give some hint to A about the content of what it is that he wants to convey, but they do not allow S to convey very much about the content of the message. S can use a pure mutual belief act to alert A that S is trying to get A to produce <u>some r</u> by virtue of recognizing S's intention to get A to produce r, but

S must rely on A's inferences about the context to arrive at the specific r that S is trying to get A to produce. When A is confronted with a pure mutual belief act, he usually must reason as follows: S it trying to tell me something, but I do not know exactly what it is. Given the context and S's utterance, what can I infer about what S would logically intend for me to understand? S must rely heavily on A's inferential abilities from there on out. We have arrived at the conclusion that there is such a tendency for pure mutual belief acts to have this property on the basis of induction. It has been borne out in all the examples we have developed to date, but more work in this area may provide counterexamples.

A second observation we need to keep in mind about pure mutual belief acts is that in distinguishing them from pure intended effect acts it will usually turn out that in the case of pure mutual belief acts, the two parties are in spatiotemporal contact, whereas this will often not be true in the case of pure intended effect acts. This is not a necessary part of the definitions, but in most examples we have developed of pure mutual belief acts in which the parties are not in contact, it turns out that we cannot tell whether or not S's intentions to get A to produce r involve A's recognizing S's intentions for A to produce r.

For example, let us say that S places a bucket of quicksand in A's path. In the kind of empirical research we have in mind we would want to deal with this utterance in a way that does not rely on S's introspective reports to decide whether this is a pure intended iffect act or a pure mutual belief act. When S and A are not in spatiotemporal contact as in this case, making this decision will often be very difficult at best. This is because S may intend

for A to come to believe that there is quicksand in the vicinity for either of two types of reasons, and there is nothing about the observable situation that will allow us to distinguish between them. Say may intend for A to believe that someone inadvertantly left the bucket of quicksand there with no intention of warning him of anything. In this case, A might produce r but not by virtue of recognizing S's intention for A to produce r. Therefore, S would have succeeded in getting uptake on his utterance as a pure intended effect act since he intended A to produce r but not by virtue of A's recognition of S's intention to get A to produce r. On the other hand, S may intend for A to come across the bucket and think that such a bizarre circumstance could not arise other than through someone's (S's) intention to tell him something. In this case, if A produces r (i.e., believes there is quicksand in the vicinity), as a result of recognizing S's intention to get A to produce r, we would have a case in which S received uptake on his utterance as a pure mutual belief act. Note also that in the situation we have outlined where S places the bucket in A's path, S may have done so with the intention of producing a pure intended effect act, but A may produce r for reasons that would normally constitute uptake on a pure mutual belief act and vice versa. Often there will be no observable differences among all these cases in which S and A are not in spatiotemporal contact.

For our purposes, the point of these illustrations is that while we readily admit that there are pure mutual belief acts in which S and A are not in spatiotemporal contact, the analysis of the cases we have developed so far requires so much speculation about which of two equally logical reasons A used in producing r that we are more interested in examining the nature of pure

mutual belief acts where S and A are in spatiotemporal contact. In these cases, there is often little disagreement about what would be a reasonable explanation for the fact that A produced r. Also, it turns out that this latter type of mutual belief act is of greater interest in our analysis of mother-child interaction.

From the way we have labeled the types of acts so far, one should not be surprised to find out that what distinguishes a pure intended effect act from a pure mutual belief act is the inclusion of a mutual belief system in the analysis of the latter. The best way to explain what we mean by a mutual belief system is to analyze pure intended effect acts and pure mutual belief acts on the basis of the beliefs involved in each.

In the case of both types of pure acts, belief(s) and desire(s) are involved. The structure of desires or pro attitudes involved may be identical in the case of both types of pure acts. For example, in both of our quicksand examples above, S desired to produce r in A. However, the structure of beliefs will be much different in the case of a pure mutual belief act than it will be in the case of a pure intended effect act.

In the case of a pure intended effect act, S has beliefs about A's beliefs. For example, in the quicksand example of a pure intended effect act, S believed that A believed that if an object is sunk into the ground in a strange way, the ground may be quicksand. On the other hand, in many cases of pure intended effect acts, A will have no beliefs at all about S. This would obviously be the case in our first quicksand example where A does not even know that a speaker exists. In other cases such as our example involving the photograph on the breakfast table, A may have beliefs about S, but these beliefs will not be

the reason for A's producing r.

In the case of pure mutual belief acts, matters stand quite differently. There are two major changes in the participants' belief structure in this case. First, A's beliefs about S become crucial. Specifically, A's beliefs about S's beliefs are what cause A to produce r. By definition, if S cannot get A to produce r by virtue of recognizing S's intentions for A to produce r, S has not succeeded in getting uptake on his mutual belief act. So the first thing that we need to add to S's beliefs about A's beliefs in order to move from a pure intended effect act to a pure mutual belief act will be A's beliefs about S. Therefore, both participants have beliefs about the other in a mutual belief act.

The second major change we can pinpoint here has to do with the content of both participants' beliefs. In the case of the pure intended effect act, S had beliefs about A's beliefs about things other than A. In our first quicksand example, S had beliefs about A's beliefs about quicksand. However, as mentioned above, when we move to pure mutual belief acts, A has beliefs about S. This major change is connected with another change - now, S's beliefs about A are concerned with A's beliefs about S. Therefore, we have something we might call reflexive belief - someone's belief about another's belief about oneself. At this point, S has recognized that he is not the only one to have believes about the communicative system. He is no longer symply trying to manipulate an audience which does not or cannot reflect on the communicative situation. Rather, he is dealing with an organism (A) which, like S, can reflect and have beliefs about this situation (which includes S). This fact makes it possible for S to use new means in order to accomplish his goal.

Specifically, S can rely on A's ability to have beliefs about S to carry out his goals as a speaker.

Schiffer (1972) has provided an analysis of the type of knowledge about ones's own beliefs and others' beliefs that seem to be necessary for an account of communication. He proposed that by taking this type of knowledge into account, it is possible to avoid many of the problems that arise in Gricean analyses, especially those involving deception where the analysis gets hopelessly bogged down in an unending series of lower order intentions. Schiffer coined the term "mutual knowledge*" (or "mutual belief*") and defined it as follows:

> (a) Definition of 'S and A mutually know* that p'.
> For convenience, let
> '$K^*_{SA}p$' = df. 'S and A mutually know* that p'.
> We can now say
> $K^*_{SA}p$ iff
>
> K_Sp (S knows that p)
>
> K_A
>
> K_SK_Ap
>
> K_AK_Sp
>
> $K_SK_AK_Sp$
>
> $K_AK_SK_Ap$
>
> $K_SK_AK_SK_Ap$
>
> $K_AK_SK_AK_Sp$
>
> .
> .
> .
>
> (1972,p. 30-31)

Schiffer pointed out that although mutual knowledge* involves a kind of regress, it is harmless.

In less formal terms Schiffer has said we can describe a state of mutual knowledge* by saying that "...it will obtain, broadly speaking, whenever S and A know that p, know that each other knows that p, and all of the relevant facts are 'out in the open'." (1972,p.32). We can see that unlike the case with pure intended effect acts, certain aspects of pure mutual belief acts must involve mutual knowledge*. For instance, in our case where S shows A a handful of quicksand, the act will not be a pure mutual belief act unless (among other things) S knows that quicksand has a certain appearance (i.e., $K_S p$), A knows this (i.e., $K_A p$), S knows that A knows this (i.e., $K_S K_A p$), A knows that S knows this (i.e.,$K_A K_S p$), S knows that A knows that S knows this (i.e., $K_S K_A K_S p$), etc. S will rely on his knowledge of A's knowledge of S in order to produce r in A. In the case of the pure intended effect act, A may or may not have any knowledge of S, but in any event, such knowledge is not a factor in causing A to produce r.

In the case of pure mutual belief acts, S and A will have to mutually know* certain things about the environment and certain rules that allow A to infer what S means by x. We can outline the inferential processes involved in pure mutual belief acts in the following way. (This account is Lewis' (1975) account with a few minor changes.)

When S produces certain sounds, marks or movements or makes certain changes in the environment, he does so for a reason. S and A mututally know* that upon perceiving S's sounds, marks, movements, or changes in the environment, A is apt to form a certain belief or act in a certain way. S wants, for some reason, to bring about that belief or action in A. Thus S's beliefs and desires give him a reason to produce the sounds, marks, movements, or changes in

the environment, and he does so. A responds to the sounds, marks, movements, or changes in the environment in a certain way and also does so for some reason. S and A mutually know* how the production of the sounds, marks, movements, or changes in the environment depends on S's state of mind. When A observes them, he is therefore in a position to infer something about S's state of mind. A can probably also infer something about the conditions which caused that state of mind. This account allows us to analyze communicative moves in terms of beliefs (including mutual knowledge*) and desires. That is, we are back to the point where we can speak of the primary reason for S's uttering x and the inferential processes that A needs to go through in order to "decode" this primary reason.

The third level of our hierarchy is the level of conventional acts. We can define a conventional act as follows.

> A conventional act is a mutual belief act in which S relies on conventional means to produce r in A.

In accordance with our hierarchy, a conventional act is both a mutual belief act and an intended effect act. In the case of a conventional act, however, we have developed an additional level in our classification by specifying that the means whereby S gets A to produce r must be conventional. There is currently a great deal of debate over the nature of convention (cf., Lewis 1969, Schiffer 1972), but for our purposes, we need not get too deeply involved in these problems. We shall accept Schiffer's definition of convention. This definition is also based on his idea of mutual knowledge* or mutual belief*. He defines a convention for a group (G) of people as follows:

> There prevails in G a convention to do an act (or activity) of type X when (or only when)... iff it is mutual knowledge* amongst the members of

> G that
> (1) there is a precedent in G for doing X, or an agreement or stipulation that one will do X, when (or only when)...;
> (2) on the basis (in part) of (1), almost everyone in G expects almost everyone in G to do X when (or only when)...;
> (3) because of (2), almost everyone in G does X when (or only when)... (1972,p.154)

It is important to note that under this account a convention can emerge on the basis of explicit agreement or on the basis of precedent. Lewis (1969) has analyzed many of the problems that arise when we deal with conventions that emerge through precedent in interdependent coordination situations. Note that the definition of a convention we are using here does not imply that we must deal with linguistic convention. A pure conventional act does not involve a linguistic system. As we shall see, a linguistic system can bring other factors into the picture. We can define a pure conventional act as follows:

> A pure conventional act is a mutual belief act in which S relies on conventional means to produce r in A, but S does not employ a linguistic system to produce r in A.

We can change our example of a bucket filled with quicksand in certain ways in order to change it from an example of a pure mutual belief act to an example of a pure conventional act. The first way we could change it would be to allow for explicit agreement between S and A on what S means by leaving a bucket of quicksand in A's path. If S and A agree before the fact that S will warn A when A is in the vicinity of quicksand by leaving a bucket of quicksand in A's path, we have a case in which S can use conventional means to produce r in A.

Conventions can also emerge on the basis of precedent in the solution of an interdependent coordination situation. That is, there are instances where

conventions arise through a precedent which was not established by means of explicit agreement. In our case of the bucket filled with quicksand, we can imagine the following situation. Say that S and A both know of an instance in which someone had warned someone else about quicksand by placing a bucket of quicksand in the path. Furthermore, say that S knows that A knows about this incident, A knows that S knows, S knows that A knows that S knows, A knows that S knows that A knows, and so on. In this case S and A mutually know* that someone once placed a bucket full of quicksand in the path to warn someone else about quicksand. Under such circumstances, S could use a bucket of quicksand to warn A and expect this method to work. The first time it worked under these circumstances, it would be a pure mutual belief act because there was no convention between S and A that by placing a bucket of quicksand in A's path, S means that there is quicksand in the vicinity. Subsequently, however, it could become a convention established through precedent. There was never any explicit agreement between S and A on this convention.

As our example illustrates, the group that subscribes to a particular convention can be comprised of as few as two people. In the case of very small groups, we might want to speak of localized conventions. As we shall see in our account of the interaction between an adult and a child, the notion of a localized convention can be very useful.

Finally, we come to the last level of our hierarchy - the level of linguistic acts. We can define acts of this level as follows:

> Linguistic acts are conventional acts in which S utilizes utterances generated in a linguistic system to get A to produce r.

We want to distinguish linguistic acts from pure conventional acts for two

reasons. First, one must recognize that there are certain kinds of communicative acts which would be very difficult to carry our or even to imagine carrying our without the help of a linguistic system. This is so because with their potentially infinite generative capacities, human linguistic systems allow us to devise and utter many things which would otherwise be very difficult, if not impossible, to say. Our second reason for distinguishing linguistic acts from conventional acts is concerned with the purposes for which we have developed this hierarchy. In the analysis of the adult-child interaction in which the adult provides metacognitive assistance to the child, it is useful to have the notion of a pure conventional act (which by definition is not a linguistic act and therefore does not involve a linguistic system) and a linguistic act. While it may be the case that most conventional acts are linguistic acts, that does not make pure conventional act any less interesting - especially when studying adult-child interaction.

In accordance with our hierarchy, a linguistic act is also a conventional act which is a mutual belief act, and a mutual belief act is an intended effect act. Therefore, a linguistic act (which is necessarily a pure linguistic act by virtue of its bottom level in this hierarchy) always fulfills the criteria for acts at all three higher levels in the hierarchy.

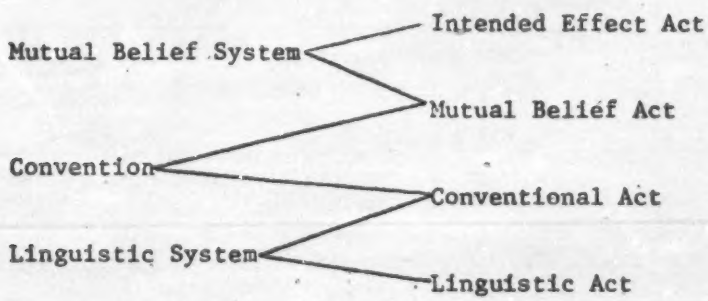
An example of a linguistic act would be the case where S discovered the now familiar quicksand pool and wanted to warn A of its location. In this case S could leave a note or sign with the words "Danger - Quicksand" or something to that effect. Of course, S also could wait for A to appear and then make the utterance verbally.

We have now outlined the hierarchy of act types we shall want to use in

our analysis of adult-child interaction. Figure 1 provides a schematic overview of the analysis. In the right hand column are the types of acts listed in descending order of generality. In the left hand column are the criteria that distinguish one level from another. If one selects an act at any of the top three levels and adds the criterion to it which appears immediately below it and to its left, one will arrive at the definition of the next level of acts.

FIGURE 1

Types of Acts Used in Analysis of Interaction



III. Metacognitive Guidance and Types of Communicative Acts

So far we have argued that adults provide much of the metacognitive regulation that young children need in order to carry out goal-directed tasks, and we have outlined a four-level hierarchy of types of communicative moves. In the present section we shall concern ourselves with examining a few ways in which we can utilize our categorization of communicative moves to analyze the metacognitive assistance adults provide for young children. We shall be working our way up the hierarchy of communicative moves from linguistic acts to pure

intended effect acts.

By the time the child reaches school age, much, if not most, of the metacognitive assistance adults provide children will be in the form of linguistic acts. There are several ways in which the adult can utilize the linguistic code in order to regulate the child's behavior. Let us focus our attention on the case in which the adult is interacting with a child who can carry our various "subroutines" in a goal-directed task but still cannot decide which subroutines should be "activated" at any particular point in the task. Everyone has witnessed a situation in which a child turns to an adult and says that he cannot solve a task, whereupon the adult replies, "Oh yes you can!" and proceeds to ask a series of appropriate questions that lead the child to the solution. All the child has done is to answer each of a series of specific questions, and he suddenly discovers the answer, at which point the adult says, "See, I told you that you could do it." While answering the questions, the child may or may not be aware of how his answers are leading up to the solution or goal. How the child can develop metacognitive abilities as a result of going through a series of steps in a task without consciously knowing where they are headed is a research question which deserves much more attention. The fact is, however, that adults spend a relatively small proportion of their interaction time with children in making explicit analyses for them of what cognitive skills or strategies are appropriate in solving certain tasks. They also spend a great deal of time simply directing the child to perform certain tasks or asking well-chosen questions which lead the child to carry out a specific series of subroutines. It would indeed be strange if these latter types of interaction did not influence the subsequent development of metacognitive

abilities in the child.

The reader may have noted that we have switched back and forth between speaking of commands and speaking of questions. This points to a larger question which has to do with the way that the adult can utilize linguistic acts to distribute the metacognitive responsibility between herself and the child. The adult can give the child commands in such a way that the child is left with a minimum of metacognitive responsibility and simply needs to respond to each of the very specific directions in order to carry out a task. For example, in the case of building a brick tower in accordance with a model, the adult could regulate the child's behavior by using the following utterances: "Find a red one. Now pick it up and turn it over. Now put it on top of the white one." In a case where the adult is relying more heavily on the child, she still might use a command, but it would require much more on the part of the child. For example, she might say, "Look at the color of the next brick in the model. Put the next brick on your tower so it will look like the model." At an even more advanced level, we can imagine the mother simply asking, "What goes next?" In this case, all she is doing is reminding the child that he is still engaged in a task. She is not telling him how to carry out the next step although she is reminding him that there is a next step.

In general, it seems that the adult would be more likely to use questions in situations where she is giving the child a larger share of metacognitive responsibility. One should also note that such questions are "unusual" in the sense that they do not conform to our normal definition. The "normal" definition of a question involves the notion that the speaker does not know

a certain fact and is asking the audience to provide him with the necessary informaiton. In the case of questions used to provide metacognitive assistance, the adult often already knows the correct answer. The function of the question is to focus the child's attention on relevant aspects of the situation rather than to provide new information.

While the analyses provided here seem to be intuitively correct, several questions remain about the ways in which adults provide metacognitive assistance to the child by using linguistic acts. These questions can only be answered through empirical research. We are just beginning such investigations.

If we now move up a level in our hierarchy, we can see that mothers may also utilize pure conventional acts as a means for providing metacognitive assistance to the child. For example, the mother may point to a brick in our tower building task in order to get the child to focus his attention on it. In addition to utilizing cultural conventions such as pointing, the mother and child may establish localized conventions either through explicit agreement or through precedent. For example, the two may explicitly agree that the mother will hand bricks to the child one at a time and the child will use each one to complete the next step in his construction. In this case, the mother may exert a considerable degree of control over the child's behavior by regulating the sequence of bricks that are used in the construction task. This control is established and maintained through the use of a series of pure conventional acts.

If we move up another level in our hierarchy of communicative moves to the level of pure mutual belief acts, what kind of interaction can we expect to find in which the mother supplies metacognitive assistance to the child?

Remember that in our analysis of pure mutual belief acts, we said that A produces r by virtue of recognizing S's intention to get A to produce r. Also, remember that in the case of a pure mutual belief act, S does not rely on conventions or linguistic systems in order to get A to produce r. An example of a pure mutual belief act in the interaction in which the mother is trying to help the child build the brick tower might arise in the case where she sees that the child has not found the piece that will be needed in the next step of the task. Let us assume that the two have not established a convention whereby each time the mother hands the child a brick he is to use it in the next step of his construction. If the mother hands him the brick in such a situation, we very well may be dealing with a case of a pure mutual belief act. The mother intended that the child would recognize that the next brick to use is the one in her hand. (She intends for) him to recognize this at least in part by virtue of recognizing her intention to get him to recognize it.

When we wish to distinguish pure mutual belief acts from pure conventional acts, we shall often encounter difficulties arising out of problems in defining the notion of convention. Furthermore, it will often be the case that there is little empirical evidence we can use to justify a claim that a particular communicative move was an instance of a pure mutual belief act as opposed to a pure conventional act or vice versa. At the present stage of its development, the theoretical framework we have outlined here may not be capable of addressing all these issues. The main point for our explication so far is that we can distinguish pure mutual belief acts and pure conventional acts on the one hand from pure linguistic acts on the other.

Perhaps the most interesting distinction in our hierarchy of types of

communicative moves is that between pure intended effects acts and all other types of acts. Remember that in the case of a pure intended effect act, S intends to produce r in A but not by virtue of A's recognition of S's intention to produce r in A. This type of communicative move is relatively rare in adult-adult interaction, but it may often be seen in adults' interaction with children. In the case of providing metacognitive guidance, it will often involve the mother's arranging the environment in such a way that the child will be more likely to focus his attention on specific aspects of the problem that are necessary for making the next step toward the goal. That is, acting as an agent capable of independent metacognitive processing, the mother will make a decision about what must be done next in the task. Based on this, she will make a decision about how it would be best to rearrange the environment in such a way that the child can focus on its relevant aspects, but the child often will not focus his attention by virtue of recognizing the adult's intention to get him to do so.

Before examining an example of a pure intended effect act where the adult is trying to provide metacognitive assistance by getting the child to focus on a particular aspect of the problem situation, let us return to the level of linguistic acts and develop for comparative purposes a case in which the adult could utilize that type of act. We see many examples of this interaction strategy where older children are involved. If the adult wishes to break the task down by having the child focus on the red bricks, she will utter such things as, "Look at the red ones." or, "What color do you need now?" In both cases, the linguistic act will be aimed at helping the child identify and focus on the bricks which will be appropriate for carrying out the next

step of the task. The need to focus on this subset of bricks is based on a metacognitive decision, given the goal of the task.

How would the adult utilize a pure intended effect act in order to accomplish the same end? She might simply separate the bricks herself and set all but the red ones aside. In order for this to be a pure intended effect act, she must do this without consulting the child since she wants him to produce r (in this case, focus on the red bricks), but not by virtue of recognizing her intention to get him to produce r. If she set aside all but the relevant bricks before ever drawing the child into the task, and the child focused on the relevant ones because the adult has arranged the environment in such a way that it is hard to focus on any other bricks, we have an instance of a pure intended effect act.

Note that in both the linguistic act and the pure intended effect act examples, the mother has produced the same general r in A - focusing on a particular subset of blocks. It would seem that both methods involve the "scaffolding" process outlined in Wood et al. (1976). She provided the metacognitive advice in the two cases we outlined above by using two quite different types of communicative moves. These two types of moves might be equally effective in getting the child to focus on the bricks that are relevant for the next stage in the brick tower building task, but there are important differences between them which lead us to believe that they would be used in quite different situations.

The differences between using linguistic acts and using pure intended effect acts to provide metacognitive advice which are used falls under the more general problem of how metacognitive processing is distributed between the adult and the child.

In general, when adults use linguistic acts to regulate a child's behavior, the child is given a greater share of the metacognitive responsibility, although as we demonstrated above, within the framework of linguistic acts there is still room for a great deal of flexibility on this dimension. In the case of pure intended effects acts, however, the adult has taken on greater responsibility in providing metacognitive assistance that was the case when she used any kind of linguistic act. She is not relying on the child for very much at all since she has arranged the environment in such a way that it would be difficult for the child not to carry out the subtask she has chosen.

As we mentioned earlier, it is often difficult to distinguish pure mutual belief acts from pure conventional acts. Of course it is even more unlikely that we shall be able to make any predictions about the relative levels of complexity or about ontogenetic sequencing in the case of these two types of acts. Future research will hopefully allow us to clarify many of these points. When we get to the level of pure intended effect acts, however, it does seem clear that we can make fairly clearcut distinctions. In many ways they are simpler and ontogenetically more basic than any of the others in the sense that adults can use them to provide metacognitive assistance to children before they can use other types of acts. Furthermore, it is not hard to think of examples of interaction between an adult and a school age child (or even between two adults) where the adult tries to help the child focus attention on a particular aspect of the problem first by using linguistic acts and then resorting to pure intended effect acts when linguistic acts fail. For example, the adult might be going through a lesson in a mathematics text with

the child and telling the child to focus on a particular aspect of a problem. That is, based on her "metacognitive judgment" about how the problem must be solved, she is breaking the problem down into subtasks and going through them one at a time. However, verbal direction may not work. The child still may be distracted by certain irrelevant stimuli. In such a case the teacher may first resort to more specific instructions about how to structure the problem solving effort. She might say something like, "Forget that other part. Just pay attention to this now." Finally, if that does not work, she may do something like folding the page over so that it will only be possible for the child to attend to the specific aspect of the problem on which she had been previously been trying to get him to focus by using linguistic acts.

In this example of levels of interaction that the teacher may resort to when other levels do not work, it is important to note that the adult might begin with a linguistic act and, after being unsuccessful at that level, resort to pure intended effects acts. However, it is difficult to imagine a situation where the opposite sequence would occur. This provides further evidence that the pure intended effect act is more fundamental than the linguistic act. It also indicates that the reason for one act's being more fundamental than another is not simply based on the participants' level of acquisition of the linguistic code.

The theoretical framework developed in this paper raises a large number of empirical issues. We are just beginning to conduct research on them and therefore have little to offer in the way of specific findings. We can, however, outline two general assumptions that will guide this research. First,

we assume that as the child grows older he takes on more and more of the metacognitive responsibility for solving a task. Among other things, this means that the child will first rely on the adult to provide the goals and means in a problem-solving situation and then will gradually take over responsibilities in this area. Much of our future empirical research will be concerned with just how this transition takes place. The second major assumption that will guide this research is that the adult will utilize a variety of types of communicative moves in providing metacogntive assistance. Furthermore, the types of moves used will depend on the distribution of metacognitive responsibility. Although we have speculated about the relationship between the distribution of metacognitive responsibility and the use of various types of communicative moves, the answers to problems in this area are still largely to be found in empirical research. These and other questions will undoubtedly supply us with problems to ponder for some time to come.

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